

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1.-14. (Canceled)

15. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

irradiating a laser light to said crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in a reducing atmosphere after the irradiation of said laser light,

wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment.

16. (Previously Presented) A method according to claim 15, wherein the second heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

17. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;  
irradiating a laser light to said crystalline semiconductor thin film; and  
carrying out a second heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element after the irradiation of said laser light,  
wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment.

18. (Original) A method according to claim 17, wherein the second heat treatment is carried out at a temperature of 900 to 1200 °C.

19. (Previously Presented) A method according to claim 17, wherein the second heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

20. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in a reducing atmosphere after the second heat treatment.

21. (Original) A method according to claim 20, wherein the third heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

22. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element after the second heat treatment.

23. (Original) A method according to claim 22, wherein the third heat treatment is carried out at a temperature of 900 to 1200 °C.

24. (Original) A method according to claim 22, wherein the third heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

25.-27. (Canceled)

28. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform at least the portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film; and  
irradiating a laser light to said crystalline semiconductor thin film; and  
carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in a reducing atmosphere after the irradiation of said laser light,  
wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment, and  
wherein the second heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

29. (Canceled)

30. (Previously Presented) A method of fabricating a semiconductor device comprising:  
forming a semiconductor film comprising silicon over a substrate;  
crystallizing said semiconductor film;  
irradiating a laser light to the crystallized semiconductor film wherein an oxide is formed over a surface of said crystallized semiconductor film at said crystallizing step or said irradiating step; and  
subsequently heating the crystallized semiconductor film provided with said oxide formed over said surface thereof in an atmosphere which reduces said oxide,  
wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

31. (Previously Presented) A method of fabricating a semiconductor device comprising:  
forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film wherein an oxide is formed over a surface of said crystallized semiconductor film at said crystallizing step or said irradiating step; and

subsequently heating the crystallized semiconductor film provided with said oxide formed over said surface thereof in an atmosphere which reduces said oxide,

wherein said atmosphere comprises hydrogen, and

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

32. (Currently Amended) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to said crystallized semiconductor film ~~to crystallize said semiconductor film;~~

etching a surface of the crystallized semiconductor film after the irradiation of said laser light to remove an oxide therefrom;

heating the crystallized semiconductor film in a reducing atmosphere after said etching step to form a flattened surface of the crystallized semiconductor film.

33. (Currently Amended) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to said crystallized semiconductor film ~~to crystallize said semiconductor film;~~

treating a surface of the crystallized semiconductor film with hydrofluoric acid after the irradiation of said laser light to remove an oxide therefrom;

heating the crystallized semiconductor film in a reducing atmosphere after said treating step to form a flattened surface of the crystallized semiconductor film.

34. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film wherein an oxide is formed over a surface of said crystallized semiconductor film at said crystallizing step or said irradiating step;

subsequently heating the crystallized semiconductor film provided with said oxide formed over said surface thereof at a temperature of 900 to 1200 °C in an atmosphere which reduces said oxide,

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

35. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film wherein an oxide is formed over a surface of said crystallized semiconductor film at said crystallizing step or said irradiating step ;

subsequently heating the crystallized semiconductor film provided with said oxide formed over said surface thereof at a temperature of 900 to 1200 °C in an atmosphere which reduces said oxide,

wherein said atmosphere comprises hydrogen, and  
wherein asperities of a surface of the crystallized semiconductor film are formed by  
said laser light, and said asperities are flattened by said heating.

36. (Previously Presented) A method according to claim 30 wherein said  
heating step is carried out by furnace annealing.

37. (Previously Presented) A method according to claim 31 wherein said  
heating step is carried out by furnace annealing.

38. (Previously Presented) A method according to claim 32 wherein said  
heating step is carried out by furnace annealing.

39. (Previously Presented) A method according to claim 33 wherein said  
heating step is carried out by furnace annealing.

40. (Previously Presented) A method according to claim 34 wherein said  
heating step is carried out by furnace annealing.

41. (Previously Presented) A method according to claim 35 wherein said  
heating step is carried out by furnace annealing.

42.-45. (Canceled)

46. (Previously Presented) A method according to claim 30 wherein said  
crystallizing step is carried out in an inert atmosphere.

47. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

48. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

49. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by heat treatment.

50. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

51. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

52. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

53. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in an inert atmosphere.

54. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

55. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.



56. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by heat treatment.

57. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

58. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

59. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

60. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in an inert atmosphere.

61. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

62. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

63. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by heat treatment.

64. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

65. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

66. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

67. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in an inert atmosphere.

68. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

69. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

70. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by heat treatment.

71. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

72. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

73. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

74. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in an inert atmosphere.

75. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

76. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

77. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by heat treatment.

78. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

79. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

80. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

81. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in an inactive atmosphere.

82. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

83. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

84. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by heat treatment.

85. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

86. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

87. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

88. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a video camera.

89. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a digital camera.

90. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a projector.

91. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a head mount display.

92. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a car navigation system.

93. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a personal computer.

94. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a portable information terminal.

95. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a video camera.

96. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a digital camera.

97. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a projector.

98. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a head mount display.

99. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a car navigation system.

100. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a personal computer.

101. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a portable information terminal.

102. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a video camera.

103. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a digital camera.

104. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a projector.

105. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a head mount display.

106. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a car navigation system.

107. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a personal computer.

108. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a portable information terminal.

109. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a video camera.

110. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a digital camera.

111. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a projector.

112. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a head mount display.

113. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a car navigation system.

114. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a personal computer.

115. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a portable information terminal.

116.-122. (Canceled)

123. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a video camera.

124. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a digital camera.

125. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a projector.

126. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a head mount display.

127. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a car navigation system.

128. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a personal computer.

129. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a portable information terminal.

130. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a video camera.

131. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a digital camera.

132. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a projector.

133. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a head mount display.

134. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a car navigation system.



135. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a personal computer.

136. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a portable information terminal.

137. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a video camera.

138. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a digital camera.

139. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a projector.

140. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a head mount display.

141. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a car navigation system.

142. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a personal computer.

143. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a portable information terminal.

144. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a video camera.

145. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a digital camera.

146. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a projector.

147. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a head mount display.

148. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a car navigation system.

149. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a personal computer.

150. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a portable information terminal.

151. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a video camera.

152. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a digital camera.

153. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a projector.

154. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a head mount display.

155. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a car navigation system.

156. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a personal computer.

157. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a portable information terminal.

158. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a video camera.

159. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a digital camera.

160. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a projector.

161. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a head mount display.

162. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a car navigation system.

163. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a personal computer.

164. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a portable information terminal.

165. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a video camera.

166. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a digital camera.

167. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a projector.

168. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a head mount display.

169. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a car navigation system.

170. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a personal computer.

171. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a portable information terminal.

172. (Previously Presented) A method according to claim 15, wherein the method further comprises:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

173. (Previously Presented) A method according to claim 17, wherein the method further comprises:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

174. (Previously Presented) A method according to claim 20, wherein the method further comprises:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

175. (Previously Presented) A method according to claim 22, wherein the method further comprises:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

176. (Previously Presented) A method according to claim 28, wherein the method further comprises:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

177. (Previously Presented) A method according to claim 20, wherein asperities of a surface of said crystalline semiconductor thin film are formed by said second heat treatment, and said asperities are flattened by said third heat treatment.

178. (Previously Presented) A method according to claim 22, wherein asperities of a surface of said crystalline semiconductor thin film are formed by said second heat treatment, and said asperities are flattened by said third heat treatment.